Screening for Asthma Among Military Applicants

Accession Consortium

21 May 2003

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Accession Medical Standards Analysis and Research Activity
Walter Reed Army Institute of Research

Outline

- AMSARA mission and goal statement
- Background data for change in asthma standards
- Exhaled nitric oxide as an adjunct screening tool

Accession Medical Standards Analysis and Research Activity (AMSARA)

- Provides epidemiologic analysis in support of the DoD Accession Medical Standards Working Group (AMSWG) to help formulate medical accession policy (DoD Directive and Instruction 6130)
- Goal: Development of evidence-based medical accession standards

AMSARA's Initiatives Related to Asthma

- Survival analysis of those who received a DQ for asthma at MEPS, waived for a history of asthma and entered active duty
- Interview study of those receiving an EPTS discharge due to asthma (IRB approved)
- SBIR contract to develop a better screening tool for asthma (IRB approved)
- REMAIN study ("Retention of Mild Asthmatics in the Navy") began 7/00 (IRB approved)
- NIOX study at the Baltimore MEPS (IRB approved) – TRADOC Funded

Proposed Change in Medical Accession Standards Wording

Para 2-23d. “Asthma, including reactive airway disease, exercise induced bronchospasm or asthmatic bronchitis, symptomatic after the 13th birthday.”

Potential Savings of Revised Standard

- At least 600 applicants no longer being disqualified every year at MEPS for a history of asthma
  - Time savings for waiver authorities
- Up to 200 more will enter AD since they can avoid the waiver process (those who choose not to enter after getting waiver)
  - Decrease recruiting costs approximately $2 million
- Downside: May let in ~60 who would be DQ and not waived under the current system
  - Lack data on whether they would perform on AD

Next Steps

- Monitor impact of less stringent accession standards for asthma
- To move attrition to the left--Need to identify current asthmatics not disclosing at MEPS (source of ~700 EPTS/year)
  - Nitric Oxide (NO) study
    - » Baltimore MEPS
    - » Started 26 August 2002

Nitric Oxide (NO) and Asthma

- Levels of exhaled nitric oxide has been shown in multiple studies to be higher in asthmatics than in non-asthmatic controls
- Confounders: Decreasing NO levels
  - Steroid use
  - Smoking: Potential problem in this population where smoking is prevalent
- Confounders: Increase NO levels
  - Other lung diseases: unstable COPD, bronchiectasis, and cystic fibrosis should not present a problem
  - URIs: Potential problem in this young healthy population
- No studies using exhaled nitric oxide (NO) to identify potential asthmatics have been done in the general population to date

Nitric Oxide Device

simple to use, highly reproducible results

Study Questions

- What is the range of nitric oxide levels among an unselected group of applicants?
- Does an elevated nitric oxide level correlate with a given history of asthma?
- Will an applicant reveal a prior history of asthma when given an objective measure that they think is correlated with asthma?

Methods

- Descriptive
  - Double blinded questioning for a history of asthma
  - Testing for exhaled nitric oxide
- Study Population:
  - All applicants to the US military over 17 years of age presenting to the Baltimore MEPS for their physical exam irrespective of gender or race
- $20 incentive provided to increase volunteer rate
- 10 applicants (18 years and older) randomly selected to volunteer each day
- No information obtained by the independent researcher is made known to MEPS

- The medical history obtained in the usual manner
  - recorded on DD Forms 2807-1
- Identified volunteer applicants are seen individually in a private room by the independent researcher
  - Given informed consent
  - Given a self-administered questionnaire
    - » Smoking, recent URIs, inhaler use
  - Three exhaled nitric oxide levels measures
  - Regardless of NO level obtained, volunteers are told their NO level indicates they might have asthma
  - They are questioned verbally about having a history of asthma, providing another opportunity to reveal a diagnosis of asthma
- The following day, MEPS History and Physical (DD Forms 2807-1 and 2808) abstracted to document whether the volunteer reported a history of asthma to the examining physician

Results

- Nitric oxide levels
  - Ranged from 5 ppb to 176 ppb
  - Median NO level = 13.8 ppb
  - 7% (23/335) of volunteers had NO levels > 50ppb
- Three repeated NO measurements from each volunteer demonstrated a high degree of reliability (+/- 1 ppb)

Results

- 1.7% (6/335) either answered yes to asthma question or it was revealed on DD2808/2807
- 5.7% more (19/329) revealed they had a history of asthma after being told the NO results might indicate they had asthma
  - 75% more revealed a history of asthma during this phase of the study
- TOTAL of 7.4% (25/335) with a history of asthma at MEPS

Disqualified for a history of asthma by proposed standards symptoms after 13yr

	Yes to history of asthma	Mention asthma after NO level	Total asthma history identified
NO < 14ppb	1	0	1
NO> 14 ppb	2	4	6

Disqualified for a history of asthma by proposed standards symptoms after 13yr

	Yes to history of asthma	Mention asthma after NO level
NO < 14ppb	1- likely to be waived	0
NP> 14 ppb	2- likely to be waived	4- two currently symptomatic

Limitations

- Applicants who volunteer may not be representative
  - High volunteer rate – volunteers are turned away
  - Applicants are not informed why NO test is done or what it might indicate
  - 7.4% point prevalence mirrors published data
- Asthma is a clinical diagnosis
  - Lack of diagnostic gold-standard
  - Inability to observe subjects longitudinally

Conclusions

- Being told there is an objective test that indicates one might have asthma increased “truth telling” of a potential asthma history by 75%
- NO levels at the time of the physical exam are not associated with giving a history of asthma
- NO levels may correlate with the presence of asthma
- Exhaled NO may be a useful adjunct to the physical exam in processing applicants to the US military. Preventing 50% of early attrition due to asthma would save the military over $5 million per year in recruiting and training costs.

Future

- Complete NIOX study
  - Test whether questioning based on certain NO values identifies those with current asthma
- Clinical evaluation of those with extremely high levels of NO

Proposed Functional Exam Trial for the Army

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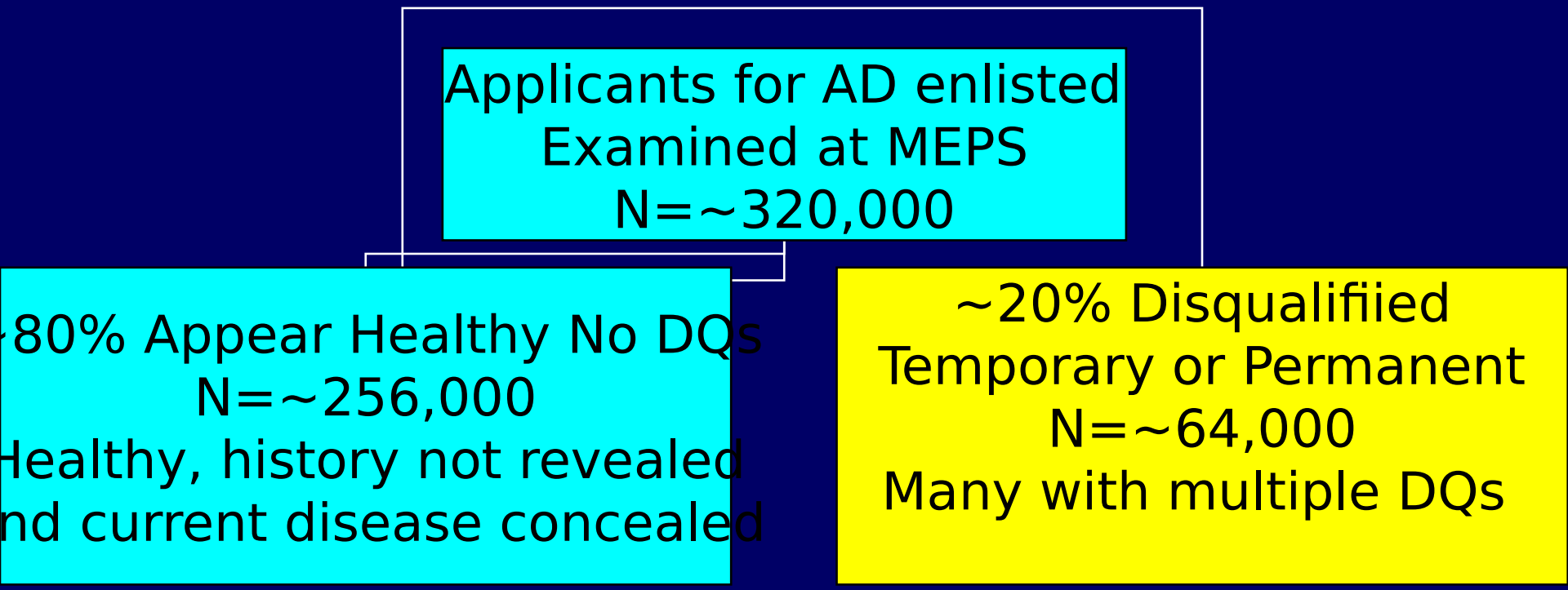
Outline

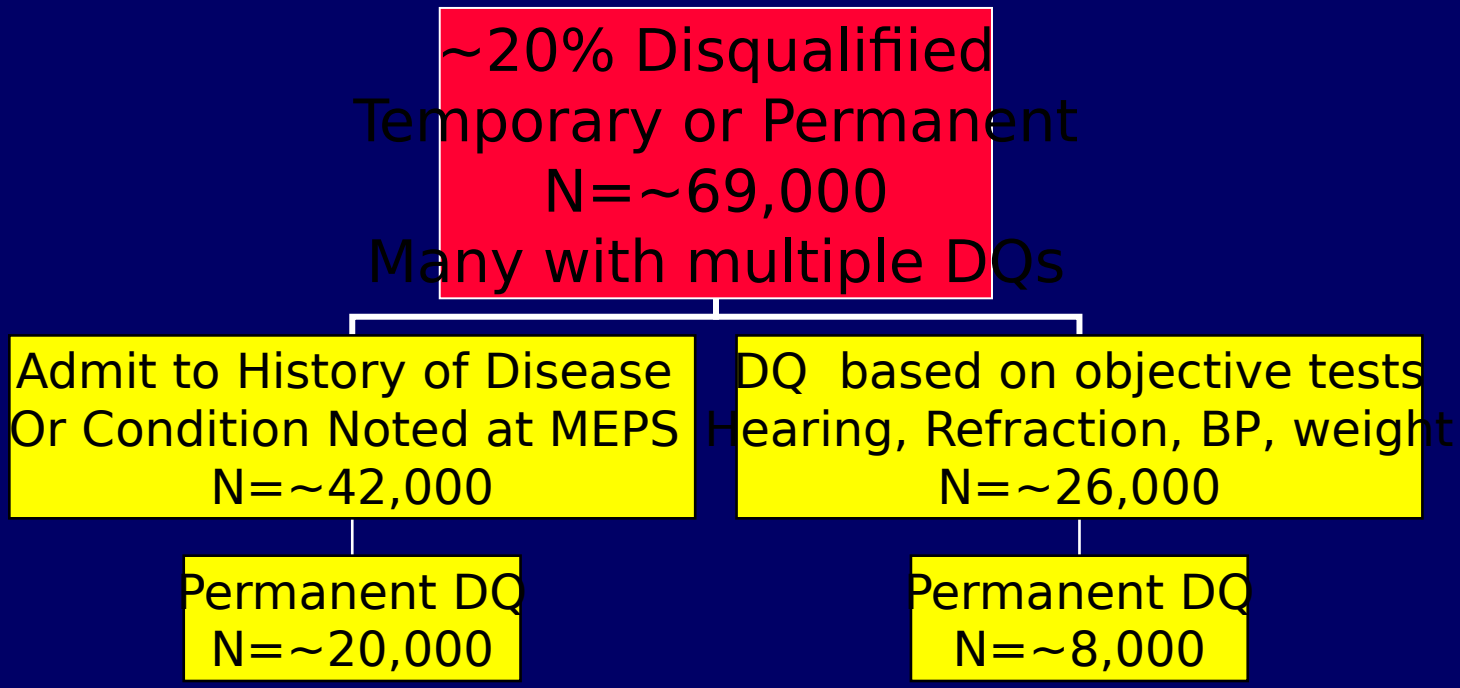
- Current effect of physical exam
  - Disqualifying by DODI 6130
- Effect of screening on recruiting & accession
  - Current screening is not evidence-based
- Thinking outside the box
- Proposed Functional Exam
- Potential impact

Active Duty Applicants By Qualification Status at MEPS*



*Projected Numbers Based on Yearly Average 1995-1999

Active Duty Accession By Qualification Status at MEPS*

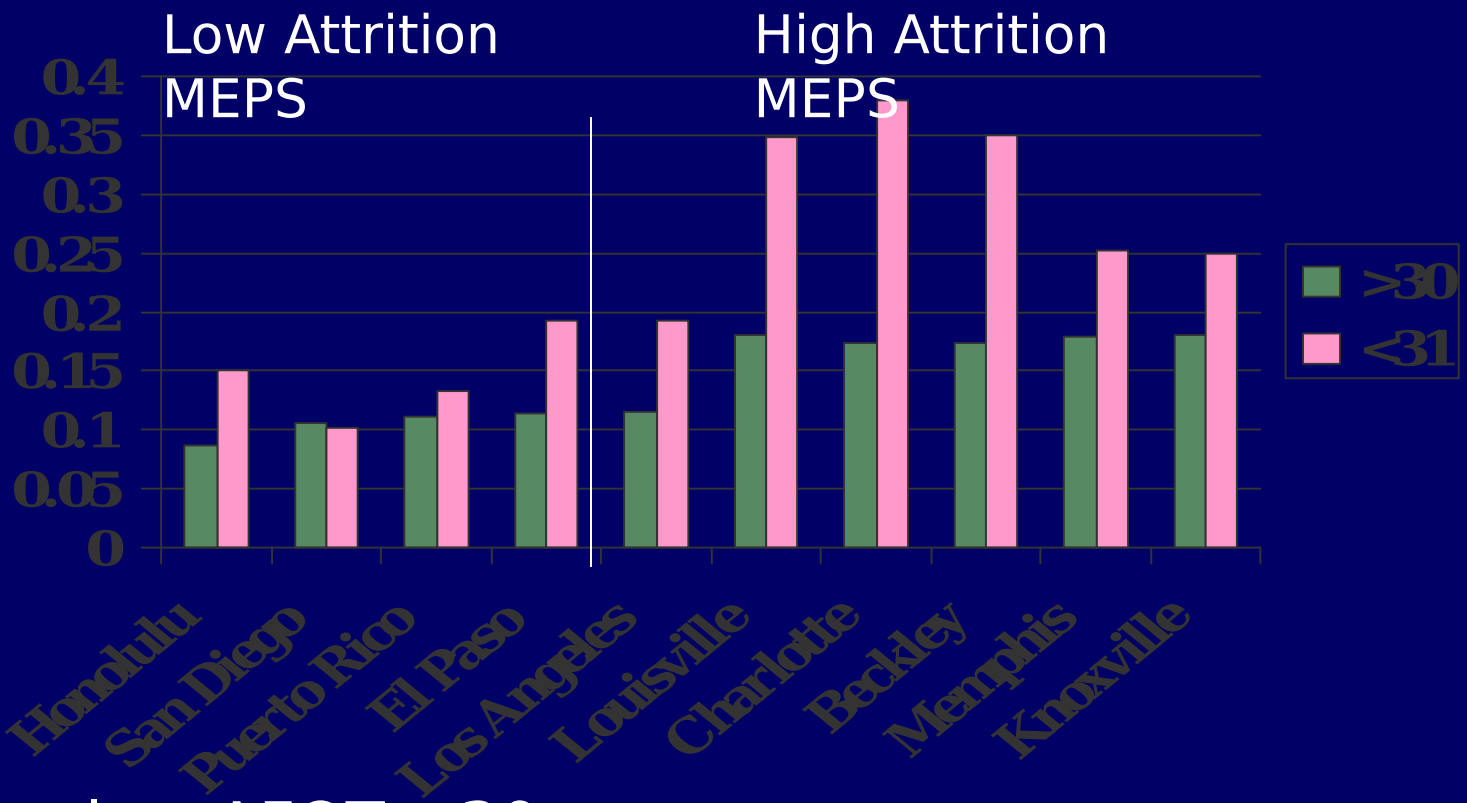


*Projected Numbers Based on Yearly Average 1995-1999, confirmed by 2000 applicants disqualified ~10% permanently

Does the Physical Reduce Attrition?

	DQ at MEPS	No DQ apparently meets physical standards
Start AD BCT	**17,000**	**121,000**
Required a waiver for entry	5,200	Unknown # ~6,000 EPTS
Did not require a waiver for entry	11,800	Less than 115,000
Early discharge for any reason	~2,790	~18,000

Six Months Attrition Rates for Selected MEPS by AFQT



Pink = low AFQT <30

6 month attrition rates < 10% from Puerto Rico regar

Observations

- Those who receive waivers for revealed conditions are retained as well as those without known conditions
- Many enter with undisclosed conditions
  - Most EPTS are for undisclosed conditions
  - Number who don't disclose conditions who finish IET unknown
- Attrition associated with MEPS of entry
  - Association with AFQT not seen at MEPS with lowest attrition rates
  - Suggests motivational issues/ psycho-social differences/ opportunity difference?

Screening for the Most Common Condition

(history of asthma-7% prevalence)

	Asthma	No asthma	Total
Test +	20,160	29,760	40% PPV
Test -	2,240	267,840	99% NPV
	22,400	297,600	320,000

sume 90% sensitivity and specificity of some unknown test

Sensitivity of history of asthma actually~24%

Present Effect of Current Exam

- Volunteers want to get into the military
  - Those with serious medical problems have no reason to reveal
- A good physical depends on a good history
  - Few conditions can be detected by a physician de novo
  - Those who conceal known conditions enter AD
- Any screen will disqualify more qualified applicants than it will exclude of those with potential future problems
  - (not shown whether conditions would impact training)

- Those revealing their medical conditions are disqualified
  - Less likely to enter active duty
  - If waived they do as well as others

Thoughts to Ponder

- The present MEPS process evolved when we had the draft (providing an opportunity not to serve)
- Medicine is more an art than a science
  - Geared for those who want help and have already “screened” themselves out
- Success (physically & mentally) seen in spite of horrendous physical problems and catastrophic events

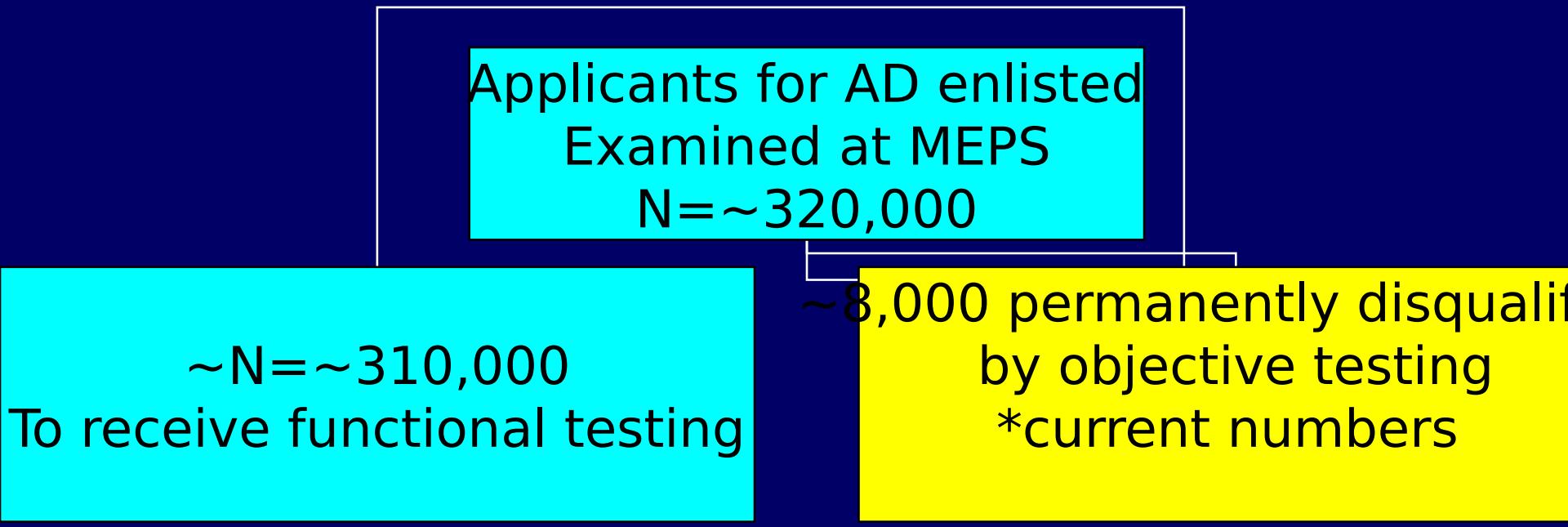
Major Contributors to Failure

- Lack of physical fitness
- Poor motivation
- History of failure
- Injuries as a result of poor physical fitness
- Mental health disorders (mostly adjustment)

A True Paradigm Shift

- Stop excluding based on history
- Base entrance on a Functional exam
  - Minimum physical fitness
- Could study the effect of objective testing
- Tone of military service could change from threats of legal action (that has never happened), "an easy way out" to - "You can do it and we will help you"
  - Start with success at MEPS
    - » Support at BCT
- Consider other options
  - Physical exam at the end of BCT
    - » Document medical problems that have arisen during training
    - » Assess elgibility for special schools

Active Duty Applicants Potential Qualification Status at MEPS*



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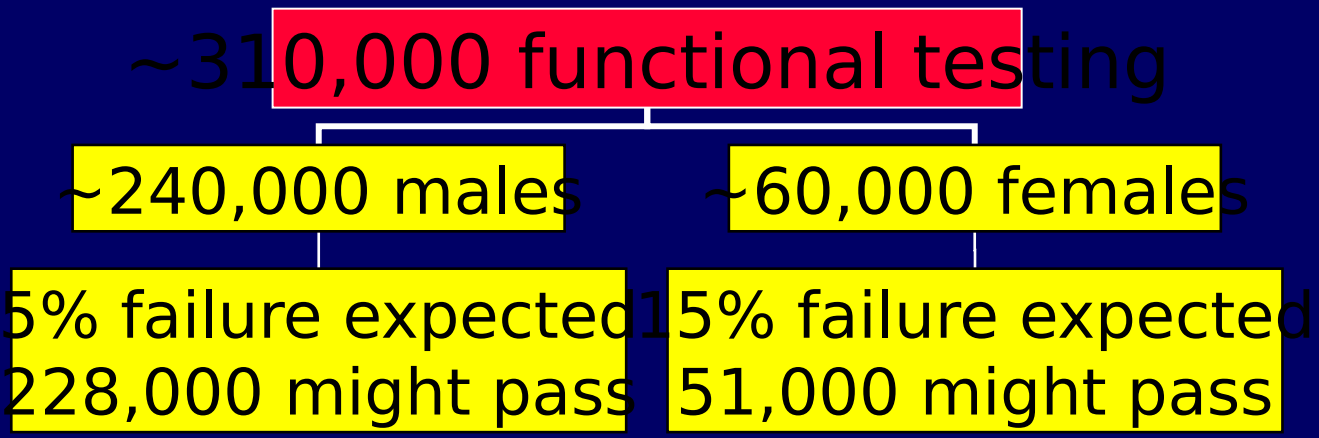


*Projected Numbers Based on Yearly Average 1995-1999 and initial testing at BCT for minimum PT

Why a functional exam makes sense

- Functional exam suited for what will be expected during BCT
- Passing a physical exam can not prevent sudden death
  - Sickle cell disease
  - Moderate/severe asthma not revealed
  - Cardiac problems
- ~30,000 more applicants will be eligible to enter AD—even if half of those with “conditions” fail still have 15,000 would likely make it
  - Decrease number needed for recruitment

Potential Benefits of Changing to a Functional Exam

- Emphasis will be placed on physical fitness prior to entry
- Recruiters will be able to provide information to applicants on how to train
  - Reduce need for number recruited (30,000 more expected to be eligible to go to BCT)
- Will be a measure of motivation to join the military
- Loss will be moved far to the left based on measurable criteria related to future attrition
- Decreased injuries during BCT with higher level of physical fitness prior to entry

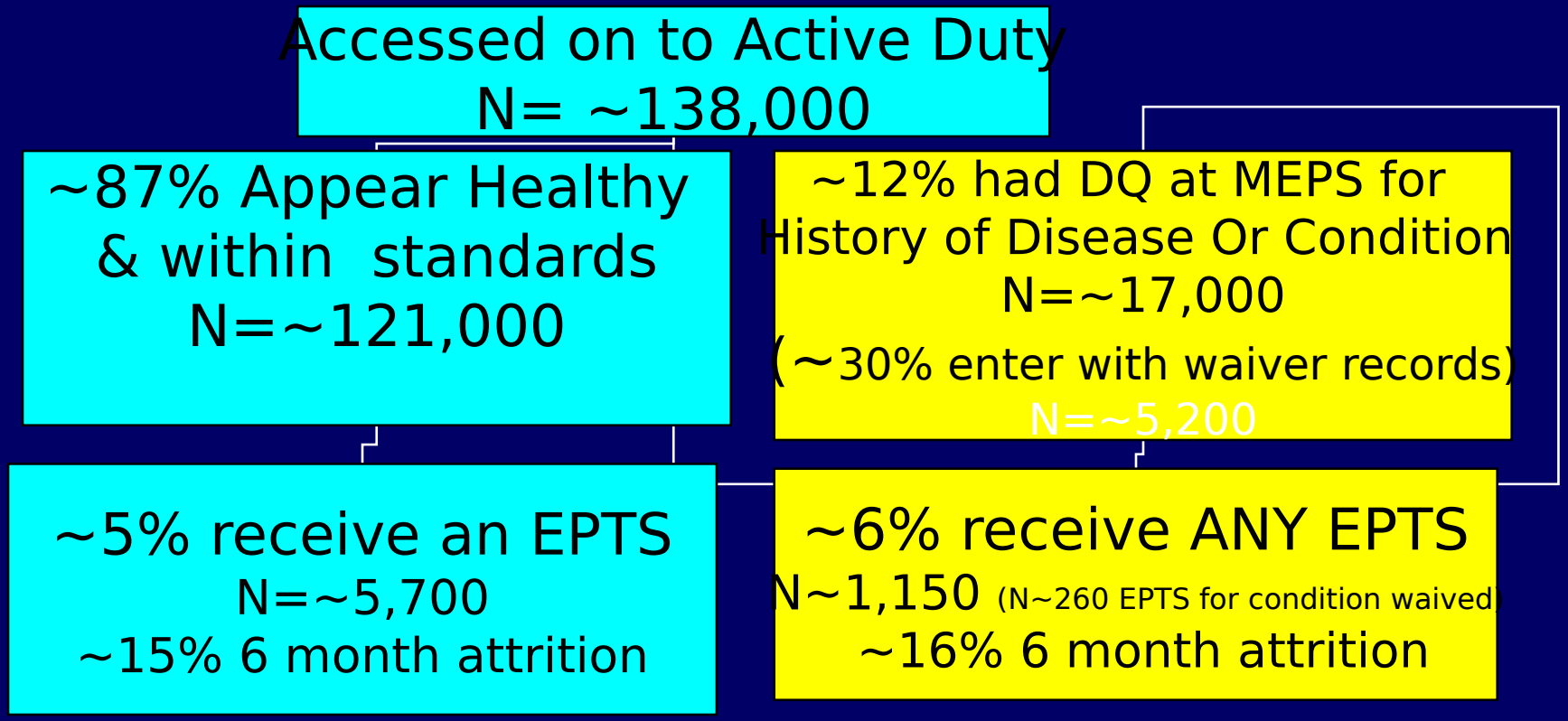
Objections?

- Recruits with serious illnesses could be admitted
  - They are already there
    - » Sickle cell disease
    - » Moderate/sever asthma
    - » Cardiac disorders
- The disability costs will raise out of control
  - Conditions that are likely EPTS do not get compensated
  - Most disability is for conditions not present at entry

- Propose trial of functional exam at several MEPS
- Estimate 10,000 applicants required ($3M)
  - Expect 1,000 or more to fail initial functional exam
  - 9,000 applicants
    - » Expect 60% to enter AD
    - » 5,400 enter AD
      - Potential net savings even with greater 6 month attrition rate
- Propose study under IRB protocol

Questions?

Average EPTS Attrition Among Active Duty Accessions by Initial Qualification at MEPS



*Estimated Numbers Based on Yearly Average 1995-1999

Purpose of the Physical Standards

To ensure that individuals under consideration for appointment, enlistment and induction into the Armed Forces of the US are

- Free of contagious disease that would likely endanger the health of other personnel
- Free of medical condition or physical defects that would require excessive time lost from duty for necessary treatment or hospitalization or would likely results in separation form the service for medical unfitness
- Medically capable of satisfactorily completing require training
- Medical adaptable to the military environment without the necessity of geographical area limitations
- Medical capable of performing duties without aggravation of existing physical defects or medical conditions

Does the Physical Meet these Goals?

- Certainly not for the stated first three goals:
  - Free of contagious disease that would likely endanger the health of other personnel
    - » HIV testing done, but other STDs are not tested for (HBV, C. trachomatis)
    - » Adenovirus, Streptococcus pyogenes, Streptococcus pneumoniae, Meningococal
  - Free of medical condition or physical defects that would require excessive time lost from duty for necessary treatment or hospitalization or would likely results in separation form the service for medical unfitness
    - » 4% of recruits hospitalized within the first month on active duty
      - Approximately half due to mental health disorders that universally leave the service
    - » Approximately 6,000 EPTS every year (not disclosed at MEPS)
  - Medically capable of satisfactorily completing require training
    - » High rate of Injuries (associated with poor physical fitness prior to entry)
- Little or no evidence of meeting last two goals:
  - Medical adaptable to the military environment without the necessity of geographical area limitations
  - Medical capable of performing duties without aggravation of existing physical defects or medical conditions
    - » Those with waivers do not leave for that medical condition

What may increase mortality?

- Hereditary anemias (Sickle cell disease)
  - Would know you have it, should opt out.
- Cardiac defect
  - Congenital abnormalities of the heart
  - Mitral value prolapse
  - Arrhythmias
- Severe/moderate asthma